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Why the US and not Brazil?
Old Elites and the Development of a Modern Economy

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We show that countries rich in natural resources provide their old elite with incentives to extract rents so high that the private sector has no incentives to build up a modern economy. If the old elite is either politically very strong or the natural resource sector is small compared to the potential of the modern sector, the old elite will choose to extract smaller rents from a growing sector. Some empirical evidence completes the paper.

Classification JEL codes: H11, O14, O38, D72

Keywords: Transition, Political Power, Relational Capital, Growth

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Old Elites and the Development of a Modern Economy*

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This version, September 2004

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1 Introduction

Some incumbent and usually unproductive elites, consisting of the top of the state bureaucracy together with an aristocracy and a monarch (if these were present), have heavily discouraged the emergence of a modern sector by means of punitive taxation. Well known examples include the experiences of 19th century Austria, Uzbekistan and Ethiopia in the 1990's, and Zimbabwe in the last few years. Other elites back reforms that reduce taxes on modern sectors. Well-studied examples include 19th century England, Poland in the 1990's and Kazakhstan just last year. Why this divergence?

The general answer on which economists, political scientists, and sociologists agree is that some elites fear a loss of power over the division of tax receipts by the development of a modern economy. This is coupled with the impossibility of the modern sector to buy out the old elite by offering future tax revenues.[1] On this impossibility of a buyout, Acemoglu (2002) remarks that 'there is no outside agency with the coercive capacity to enforce such arrangements'. Even if such coercive agencies were available, there would still be a missing markets problem in the sense that one would want to bind future firms and future generations to previously agreed upon transfers.

On the question of what it is about a modern sector, which minimally includes modern industry and services, that makes old elites fear them, opinions diverge. One explanation has been that old elites fear the technology of a modern sector. One version, termed the 'economic-losers hypothesis' by Acemoglu and Robinson (2000a), is that incumbents prevent the adoption of new technology by others in order to prevent erosion of their sunk technological capital. Such 'machine-rage' is however seldom successful and thereby of scant empirical relevance. The historical attempts of old technology holders to prevent the adoption of new technologies such as book-printing, guns,

[1] Economic works include Krueger (1993), Acemoglu (2003), Acemoglu and Robinson (2000a, 2000b, 2000c, 20002), Krusell and Rios-Rull (1996), Parente and Prescot (1994, 1999, 2000), Hahn (2003). North (1990) and Guy (2000) survey the literature including references to non-economists.

mechanized transport, mechanized sewing-machines, and the internet have been spectacularly unsuccessful.

Another version is that technological growth is the driving force behind the growing *relative* economic might of industrialists which in turn leads old elites to block technological growth as a means of preserving power. The key relevant assumptions employed by Acemoglu and Robinson (2000, 2002) are that the modern sector grows exclusively via technology and that its growth increases the odds that an old elite loses power.

This hypothesis too is implausible though: even the most dictatorial regime is nowadays 'on-line' and employs the latest technology to extract rents and subdue opposition. Technology benefits 'old-sectors' sometimes even more than the new sectors. For instance, even in dirt-poor areas devastated by rent-seeking inspired wars, such as the Congo at present, mineral extraction uses the best technology available. It is hence more the case that the modern sector in many developing countries is kept very small due to rent-extraction rather than that technology per se is resisted. Indeed, the history of white-elephants in Africa, i.e. technological prestige projects that never made productive sense, suggests that dictatorial regimes are often keen to embrace modern technology themselves.

We argue that it is not technology that is feared by the old elite, but rather the rise of networks of business relations that typify modern sector growth. In a micro-model we detail the productive importance of networks in the sense that comparative advantages can be better utilised in larger networks. These networks and the institutions that result from the investment in such networks also form an alternative political network that is an opposing power to that of the old elite. In our model, the power of the new politicians connected to the modern sector network sets an upper limit on the possible extraction of rents by the old elite. Individual firms are small enough not to benefit individually from this political effect. Hence, when the old elite allows the modern sector to grow it has to weight its loss of political power against the growing productivity of the economy. The old elite will be able

to extract a smaller share from a growing pie. Crucial in determining what happens is then not only the initial strength of the old elite, but also the size of the pie in the absence of any modern sector, i.e. the size of the traditional or natural resources exploitation sector. The higher this 'fixed-pie', the more an old elite has to lose by a growing modern sector and hence the higher the disincentives provided by the old elite for the modern sector. The loss in political power that goes hand in hand with the growing modern sector (and the bigger pie) adds to the "tax-base" effect identified by McGuire and Olson (1996). Where McGuire and Olson only observe that lower rent extraction rates lead to higher modern sector investments and thus those in power will not extract all rents, we argue that they may still do so, if the political base is eroded due to the growth of the modern sector. Especially the existence of a traditional sector which does not have a political base increases the incentives of the old elite to supress a modern sector. As Olson (1996) observes in economies based upon such traditional sectors, a lack of coordination among agents exists. But coordination is necessary to set up institutions fostering growth and restricting rent extraction by the old elite.

Another point where we differ from previous analyses is that we think it a mistake to view power as all-or-nothing, which is the assumption employed in all previous formal models we know. The loss of power of the old elite is seldom discrete but continuous. It may be pointed out that even today there is a British, German, and Austrian aristocracy that enjoys considerable rents. Neither is the aristocracy the only remnant of 'old power'. The biggest landowners in Britain today are the aristocracy, the crown, and the Church of England. Churches in Germany are still financed via the federal tax system, more than a century after the key reforms that allowed industrialization to take place. Hence in our model, old elites fear the loss of some degree of power, but not the total loss of their power.

Our model helps to explain why in recent cases of countries breaking up, the smaller resource-rich parts actually suppressed the modern sector to a greater extent than other parts did, for instance Uzbekistan after the break

up of the USSR. This could not have arisen in models where the old elite in the previously existing country has already 'lost entirely' to a modern sector or where these old sectors where of less importance. Our model furthermore makes it possible to define what the 'feared' modern sector is and what the old sector is: the modern sector is any sector that needs new and large networks to flourish. Sectors that flourish without networks are not a threat and are thus expected to be a welcome source of rent extraction for any old elite. This fits the observation that technologically advanced mineral extraction companies are welcomed in many dictatorships whilst modern service industries are not. We provide some evidence for our theory with respect to the former USSR countries in section five.

In the next Section we discuss the literature, after which we present our main model and results. Section four gives micro foundations for the importance of networks for a modern sector. Section five discusses empirical evidence for our theory, drawing particularly on the differences experienced by Brazil and the US. The final Section concludes.

2 Literature

Anne O. Krueger (1993) dedicated her Ohlin Lectures to reforms in developing countries. She discussed informally various forces that determine how politicians deal with "Market reactions to politicians' decisions [that] influence both individual politicians and their further decisions and also change the nature of the political balance among competing political groups".

Acemoglu and Robinson (2000, 2002) and Acemoglu (2003) provide specific models on this question. In Acemoglu and Robinson (2002), an incumbent government has to decide whether to allow a growth enhancing reform or not. Introducing the reform will change the distribution of power in the economy and the costs to replace a government. The government will be replaced if the public expect more benefits from a new government than it suffers from the costs of financing the change in government. The authors

show that the old elite may block reforms because technological and institutional reforms will increase the probability that the incumbent loses his position.

Krusell and Rios-Rull (1996) argue that vested interests of some agents prevent the adoption of a new technology. In their model, these agents are market incumbents who want to block competition by new, modern firms with a better technology.

Acemoglu and Robinson in another set or papers (2000b, 2000c, 2001) address the question of democratization and redistribution in a two (three) class society. (Full) Democratization will lead to the poorest class determining redistribution. These articles contain two arguments. First, they argue that democratization can be seen as a policy to appease the lower class by guaranteeing redistribution not only in the current period with a strong lower class (2000b,c) but also in the future, thus avoiding social unrest and larger demands (socialization of private property). Partial democratization, shifting power to a middle class, is dominated because it is a sign of weakness of the old elite (2000b) even though it would mean less redistribution and thus less contributions that have to be made by the old elite. Second, they study the stability of a political system, namely they allow the poor to start a revolution and the rich to stage a coup (2001). A system is consolidated if the costs of a revolution to the poor or the costs of a coup to rich are too large. The ruling class will use redistribution policies to avoid a system change if possible. Redistribution is affected by measures of democratic freedom - the costs of staging a coup and starting a revolution. A very democratic and equal society (coups are expensive, revolutions cheap) has the highest rates of redistribution. A very undemocratic system (coups are cheap and revolutions expensive) has the lowest rates of redistribution. When coups become cheaper with greater inequality, then greater ex ante inequality force the poor to refrain from too much redistribution and thus avoid a coup. Under this constellation, higher inequality leads to lower redistribution. In the case that the costs of revolution and coups are large but not too large, Acemoglu and

Robinson observe that the system will continuously switch between the two systems. One aspect of this theory of political transition is that higher inequality in a society always implies a higher volatility of fiscal (redistributive) expenditure and may, in some cases, change the status of the system.

Parente and Prescott (1994, 1999, 2000) show empirically that barriers to technological reforms affect economic growth. In the 2000 Walras Lecture they explicitly argue a certain form of rent extraction, namely that the government (the king) extracts rents by granting monopoly rights to certain producers and that these rights lead to less competition and an inefficient use of available technology and hence hampers the growth potential of an economy. Countries differ in how much governments made use of this instrument to generate income.

Hahn (2003) argues that an old elite is not always observed by others, but nevertheless it has the power of sabotage, i.e. it can stop any reform. An old elite will then stop any reform as long as there is any rent remaining in the present situation. Because reformers cannot commit to future transfers to the (unobserved) old elite, reforms will then only take place after all rents are exhausted.

Conley and Temimi (2001) put forward another explanation for endogenous enfranchisement decisions. Similar to the present approach, the non-ruling class has some power. Instead of a continuous participation as in our model, in their model the dominated class can inflict a punishment on the ruling class at a cost. If the conflicts of interest are not too large between the groups, (full) enfranchisement is the less costly option to avoid such a punishment by the ruling class. In our model a smaller traditional sector brings the interests of the modern sector closer to those of the old elite.

3 A Model of Political Power, Rent Extraction and a Modern Sector

The economy consists of two sectors. The old sector is completely independent of contact creation. We think here mainly about the extraction and sale of natural resources to the world market. This includes cash-crop agriculture, which can be understood as the sale of exploitation of the fixed resource land. The modern sector needs a network of business relation (relational capital[2]) to function and prosper. The essential role of these networks is to allow firms and individuals to specialize in their comparative advantage and to outsource all other activities. In the old sector 0 we assume that the income generated is fixed at $\bar{y}$.

Sector 1, the modern sector, is populated by an infinite number of firms with mass 1. The output of a representative firm is $f(RC_t) = {RC_t}^{\alpha}$ where RC_t is the size of the network of contacts of an individual firm at time t.[3] This production function is kept simple for presentational purposes, but we will discuss the necessary assumptions on a general production function later.[4] Firms face diminishing returns to scale, i.e. $0 < \alpha < 1$. RC is productive for one period only but it determines the political power of the modern sector in the next period. RC can be generated (or maintained) at marginal cost c. One can see this as the labor costs of building a network with a fixed wage rate (constant outside option). This means that from the point of each firm, each period's decision on RC has no forward-looking aspect to it and thus derives from one-period profit maximization motives. In section 5 we will

[2]Bezemer et al. (2003) and Frijters et al. (2003) introduce this concept in a dynamic growth model where the focus is on the inner workings of the modern sector with respect to contact formation, contact destruction, and technological growth. The present paper can be seen as detailing the potential political importance of this concept.

[3]The reason why we denote the single input as RC is that we want to emphasize our view that modern sector's power increases due to the business network of the modern sector. One could also use any arbitrary input (labor, capital) to measure the size of the modern economy and claim that this goes along with the build-up of political power.

[4]Another simple example which yields the same result is $f(RC_t) = \ln RC_t$.

also provide some microfoundations how contacts matter for production.

The political sector contains two types of politicians. The first type decides purely in the interest of the old elite. These are agents paid by the old elite or powers-that-be such as existing monarchs and existing political elites. Of the second type are representatives of the modern sector. We take the political network of the first group to be fixed and equal to PP_0 which hence indicates the power contained by the political network of existing non-modern sector elites. We refer to this group as the 'old elite'. The political network of the second group is directly proportional to the average size of the networks of the modern sector denoted as $\overline{RC}_t$, i.e. equals $PP_m = M_0 + \overline{RC}_t$. This points to the dual role of relational capital, i.e. its direct productive role in securing sold output and its role as a network leading to political power. One may interpret the manager involved in maintaining a relationship between one firm to another as a member of the modern elite whereas M_0 represents the owners of modern sector firms that are inborn members of the modern elite. M_0 represents the exogenous political power of the modern sector, it may also represent support by some (avant-garde) members of the old elite.

To derive an additive notion of power we assume that PP_0 presents the number of politicians of the old elite and PP_m as the number of the new elite. (An equivalent interpretation is to view them not as numbers of politicians but as some aggregate support such as campaign funds or the number of voters that can be swayed). Suppose that the country consists of a large number of regions of the same size. In each region the party that employs most politicians in this region wins the local elections and controls the decisions of that region. Elections take place sequentially and only the politicians send by the winning party are 'absorbed' (they take office), by that region whereas losing politicians can be moved to other regions, similar to the payment function in a sequential first price multiple unit auction.

There are many equilibria in this game but for all of them the old elite

will control a share of $\frac{PP_0}{PP_0+M_0+\overline{RC}_{t-1}}$ of all regions.[5] The share controlled by the new elite is equal to $(1-\frac{PP_0}{PP_0+M_0+\overline{RC}_{t-1}})$.

The ruling politicians decide on the rent extraction rate from the economy. As far as they decide on taxes funding public goods beneficial for all, incentives of all politicians will overlap and there will be no disagreements. We hence leave them out of consideration and focus on taxes that have no direct benefit. There is only one tax in our framework, namely a tax on produced output accruing to the old elite (we thus take taxes to be net of flows to the holders of RC). In each period, the current set of politicians bargain over taxes. For the politicians of the modern sector, it is the case that their preferred tax rate is going to be $\tau_t = 0$ in all periods, simply because these taxes are distortionary and the revenue that is raised by them has to be shared with individuals not from within that sector. The full weight of the 'new elite' will hence be towards $\tau_t = 0$. On the other had, the 'old elite' will always want positive taxes on the modern sector. As their maximum position, they could wish $\tau_t = 1$.

Firms are active in all regions and have to choose their investment for the whole country. They will hence take the average rent extraction rate as the one determining investment. The maximum amount of tax an old elite

[5] To see this, in equilibrium, the "modern elite" can always choose the number of politicians sent by the old elite $+\varepsilon$ to the first regions where the old elite sends the average or less. After the first $1-\frac{PP_0}{PP_0+M_0+\overline{RC}_{t-1}}$ share of regions they will be out of politicians (assuming the old elite sends the average to all regions), such that the rest (share $\frac{PP_0}{PP_0+M_0+\overline{RC}_{t-1}}$) of the regions goes to the old elite. The best the old elite can do is distribute their politicians equally over all regions.

could extract from each firm equals the proportion of regions they control.[6]

In relation to McGuire's and Olson's (1996) model of rent extraction three comments may be illustrative. First, in the language of McGuire and Olson, our old elite is an (unproductive) autocracy. Second, in contrast to their approach our autocrats have to share power with the modern sector politicians. Third, we abstractcompletely from the public good game but concentrate on the Leviathan aspect we have in common with McGuire and Olson's contribution.

To summarize, we assume an additive notion of power, where the weight of the old elite in political decision making is $\frac{PP_0}{PP_0+M_0+\overline{RC}_{t-1}}$. Given that the new elite always choose $\tau_t = 0$, the 'old elite' at each moment in time can choose a tax rate τ_t that is constrained by the maximum (expected) tax rate $\overline{\tau}_t = \frac{PP_0}{PP_0+M_0+\overline{RC}_{t-1}}$ it can push through given the political constellation .

Remark 1 *A feasible outcome of this economy is thus any set* $\{\tau_0, .., \tau_T\}$ *of which each* τ_t *lies in the region* $\left[0, \frac{PP_0}{PP_0+M_0+\overline{RC}_{t-1}}\right]$ *where* $\overline{RC}_{t-1}$ *is endogenous.*

Note, our political set-up is a long cry from most political economy models that assume that power ultimately is equally divided over individuals via the one-man-one-vote assumption. We explicitly allow the old elite to have more power than the politicians from the modern elite. For developing countries the one-man-one-vote assumption is very problematic. Even in countries that are notionally democratic, elected politicians are not the only ones that make decisions. Demands from the military, industry, agricultural lobbies, unions,

[6] Another micro foundation for our notion of political power is the following. Elections take place in each period after investment decisions but politician beforehand commit to a policy τ. There exists an unknown pivotal issue that voters care about. The first politician to 'hit' this issue wins the election. We assume each politician has the same probability to hit the issue, i.e. the number of hits over time is linear in the number of politicians. That is in expectation, $\frac{PP_0}{PP_0+M_0+\overline{RC}_{t-1}}$ of times the policy will be chosen by politicians from the old elite. Firms in this story invest, given the expected extraction rate that will result from elections.

lower-level bureaucracies, etc., can often not be ignored by elected politicians. Very often, interest groups directly control certain (semi-) state organs and hence by-pass elected politicians completely. Rather than adopting the one-man-one-vote assumption in a set-up where a single unit decides all (i.e. a national administration), we take the dynamics of power in the whole economy as the central problem. It is then much more natural to conceive of power as a continuous concept.

The timing is as follows. There is an infinite number of discrete periods. At period 0 the modern sector is non existent, i.e., $RC_0 = 0$. The modern sector starts with period 1. Each period consists of two stages. First the old elite chooses a $\tau_t \leq \overline{\tau}_t$ as described above. Then firms choose independently from each other a $RC_t(\tau_t)$ and produce $y(RC_t)$. Taxes are paid and the rest is consumed. Each individual in this economy uses exponential discounting at rate ρ. The per-period pay-off of each individual entrepreneur in the modern sector period is now

$$\pi_t^M = (1 - \tau_t) f(RC_t) - RC_t c.$$

The old elite's per-period payoff equals

$$\pi_t^E = \tau_t \left(f(\overline{RC}_t) + \bar{y} \right).$$

Both agents maximize the discounted stream of per-period payoffs. Given the assumption that firms are small, such that modern sector firms do not take into account the political influence they gain by setting up firm networks, their optimal behavior is determined by maximizing the return to RC_t in each period. Due to the setup, only the old elite faces a dynamic problem. Given that τ_t is the only state variable, we in principle have to determine a dynamic equilibrium. We first circumvent inter-temporal trade-offs by looking at the case where the elite has a zero discount rate, and later allow for positive discount rates. With zero discount rates, the elite's maximization problem reduces to finding the per-period profit maximizing tax that is sustainable.

The within-period trade-off that the old elite then faces is simple: if it decides to tax the modern sector by a large amount, the modern sector will

not develop and there will be less to tax. If it does not tax the modern sector heavily, the modern sector will grow fast yielding more tax revenues, but it will mean that the tax revenue from the old sector is lower. Intuitively, if $\bar{y}$ is very high (or $f(.)$ not very high), we would expect the 'old elite' to be relatively little interested in allowing a modern sector to grow and we should see punitive taxes on the modern sector.

4 Choices and Constraints of the Old Elite

In each period, firms choose RC_t without taking into account the externality of their behavior on τ_{t+1}. The optimal level of RC_t of the individual firm and thereby of the whole economy, then equals

$$RC^*(\tau) = (\frac{\alpha(1-\tau)}{c})^{1/(1-\alpha)}$$

Given this reaction function, the old elite can predict not only the investments of the new sector but also its relative political power at the end of the period. Consider the steady state of the model. In the steady state, the old elite will maximize its period payoff under the political restriction:

$$\max \tau(\overline{y} + f(RC(\tau)) \text{ s.t. } \tau \leq \overline{\tau}_t = \frac{PP_0}{PP_0 + M_0 + \overline{RC}(\tau)}.$$

We first need the following lemma.

Lemma 1 *$\overline{\tau}_t(RC(\tau))$ has at least one and at most three intersections with τ.*

Proof. At least one intersection exists because $\overline{\tau}_t(RC(\tau))$ is continuous in τ, $\overline{\tau}_t(RC(\tau = 0)) > 0$ and $\overline{\tau}_t(RC(\tau = 1)) < 1$. At most three intersections exist when $\overline{\tau}_t(RC(\tau))$ has at most one inflection point for $0 < \tau < 1$. This is the case when $\frac{d^2\overline{\tau}_t(RC(\tau))}{d^2\tau} = 0$ has either no or one solution. The necessary condition is equivalent to $\frac{(2-\alpha)RC(\tau=0)}{(PP+M)\alpha} = \frac{1}{(1-\tau)^{1/(1-\alpha)}}$. The left hand side of this equation is a positive constant whereas the right hand side is a strictly

increasing function in τ. Hence there is either one or no solution. ■

Because of continuity, the generic outcome is having either 1 or 3 such 'fixed points'.[7] If there are three such 'fixed points', we refer to: $\tau^{\min} = \min\{\tau \left| \tau = \frac{PP_0}{PP_0+M_0+\overline{RC}(\tau)} \right.\}$, $\tau^{\max} = \max\{\tau \left| \tau = \frac{PP_0}{PP_0+M_0+\overline{RC}(\tau)} \right.\}$ and τ' as the potential third point fulfilling $\tau = \frac{PP_0}{PP_0+M_0+\overline{RC}(\tau)}$. $\tau^{\min}$ represents a lower limit of a tax rate that the old elite can always push through, given that RC is limited from above. $\tau^{\max}$ is the maximum tax rate the old elite can push through given the guaranteed power M_0 of the modern sector. If there is only one fixed point, we denote it by $\tau^{\min}$ if $\overline{\tau}_t(RC(\tau))$ is convex at this point and as $\tau^{\max}$ if $\overline{\tau}_t(RC(\tau))$ is concave.

To state our result, we denote by $\tau^{old} = \arg\max \tau(\overline{y} + f(RC(\tau))$, the tax rate the old elite would choose in the absence of modern sector politicians. It should be immediate that, in all cases the only candidates for a long-term outcome is the set $\{\tau^{old}, \tau^{\min}, \tau^{\max}, \tau'\}$. Figure 1 provides an example with three intersections. τ^{old} is in this example between $\tau^{\min}$ and τ' at the maximum of the profit curve. Figure 2 provides two examples for the case of only one intersection. In case 1, we refer to the intersection as $\tau_1^{\max}$, in case 2 as $\tau_2^{\min}$. The following proposition states the result.

Proposition 1 *(Steady State Extraction Rates)*
If $\overline{\tau}_t(RC(\tau))$ *has only one fixed-point* τ^{fp} *then the steady state rent extraction rate of the economy is given as* $\tau^* = \min\{\tau^{fp}, \tau^{old}\}$.
If $\overline{\tau}_t(RC(\tau))$ *has three fixed points* $\{\tau^{\min}; \tau'; \tau^{\max}\}$ *then*

$$\tau^* = \begin{cases} (i) & \tau^{old} & \text{if} & \tau^{old} \leq \tau^{\min} \\ (ii) & \tau^{\min} & \text{if} & \tau^{\min} < \tau^{old} < \tau' \text{ and } \tau'(\overline{y} + f(RC(\tau')) \leq \tau^{\min}(\overline{y} + f(RC(\tau^{\min})) \\ (iii) & \tau' & \text{if} & \tau^{\min} < \tau^{old} < \tau' \text{ and } \tau'(\overline{y} + f(RC(\tau')) > \tau^{\min}(\overline{y} + f(RC(\tau^{\min})) \\ (iv) & \tau^{old} & \text{if} & \tau' < \tau^{old} < \tau^{\max} \\ (v) & \tau^{\max} & \text{if} & \tau^{old} \geq \tau^{\max}. \end{cases}$$

[7] The term generic here means that if we would see M and/or PP_0 as drawn from a continuous probability distribution, having precisely 2 intersections has zero probability of occurence.

Proof. Having established the characteristics of $\overline{\tau}_t(RC(\tau))$ we refer to figure 1 to make our argument. The old elite in the steady state chooses any τ that fulfills two conditions, namely: $\tau_t \leq \overline{\tau}_t(RC(\tau_{t-1}))$ and $\overline{\tau}_t(RC(\tau_{t-1})) = \overline{\tau}_{t+1}(RC(\tau_t))$. Hence, the set the old elite can choose from the set where $\overline{\tau}_t(RC(\tau)) > \tau$.

For the case of one fixed-point, this implies that either the old elite can choose - depending on the parameters - from the set $[0; \tau^{\max}]$ or from the set $[0; \tau^{\min}]$. The latter poses a stricter constraint. The size of the sector is determined by the solution to the constrained optimization problem.

For the case of three fixed points, the set to choose from is given by $[0, \tau^{\min}] \cup [\tau'; \tau^{\max}]$ and the solution again solves the constrained maximization problem. These are the values stated in the proposition. ■

The following figures illustrate the possibilities. We start with the three fixed point case (figure 1). In steady state, the old elite has to choose a point on the dotted line ($\tau = \tau$) where it lies below the (thick) line representing $\overline{\tau}_t(RC(\tau))$. This is because otherwise next period's tax rate is restricted to be lower than the rate chosen in this period (due to the political power constraint). Hence, in this example the old elite can choose from the area between 0 and $\tau^{\min}$ and τ' and $\tau^{\max}$. The plotted profit curve for the example reveals that the optimal choice is in this case to choose $\tau^{'}$.

Now, consider case 1 of figure 2. In this case, the additional power the modern sector can gain is restricted and the old elite has a bigger discretion to choose from. The τ maximizing the old elite's profits is τ^{old}, which is in this example among the feasible set of tax rates and therefore this point is chosen. Note, the case with a more powerful old elite allows a larger modern sector than the more constrained elite of figure 1. In case 2, the modern sector is already very strong at the beginning, which restricts the set the old elite can choose from. This is the case with the largest modern sector and lowest taxes.

What happens if the old sector is more important, i.e. if $\overline{y}$ would be

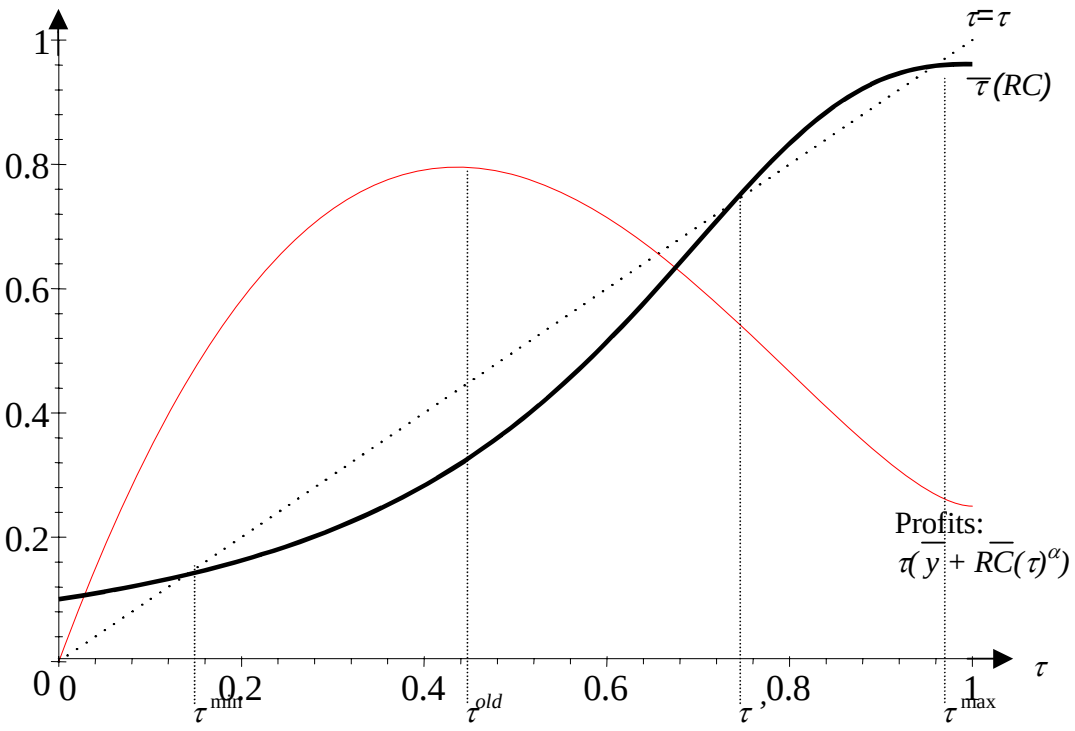

Figure 1: Profits and politically feasible extraction rates[8].

higher? This will shift the profit curve up and τ^{old} to the right. Given that the political constraint is not affected, the equilibrium size of the modern sector will either be unchanged (the same corner solution as before), or it decreases because of an increase in the equilibrium extraction rate.

These casual observations on the determinants of the size of the modern sector are now stated more formally.

Proposition 2 *A smaller size of the old sector ($\overline{y}$) never leads to a smaller modern sector.*

[8]The present figure is a plot for the following parameter values: $\alpha = 0.6, c = 0.25, PP_o = 1, M = 0.04, \overline{y} = 0.25$

[9]Case 1 is the same as above only $c = 0.4$ is larger. Case 2 is the same example as above but $M = 0.5$ is larger.

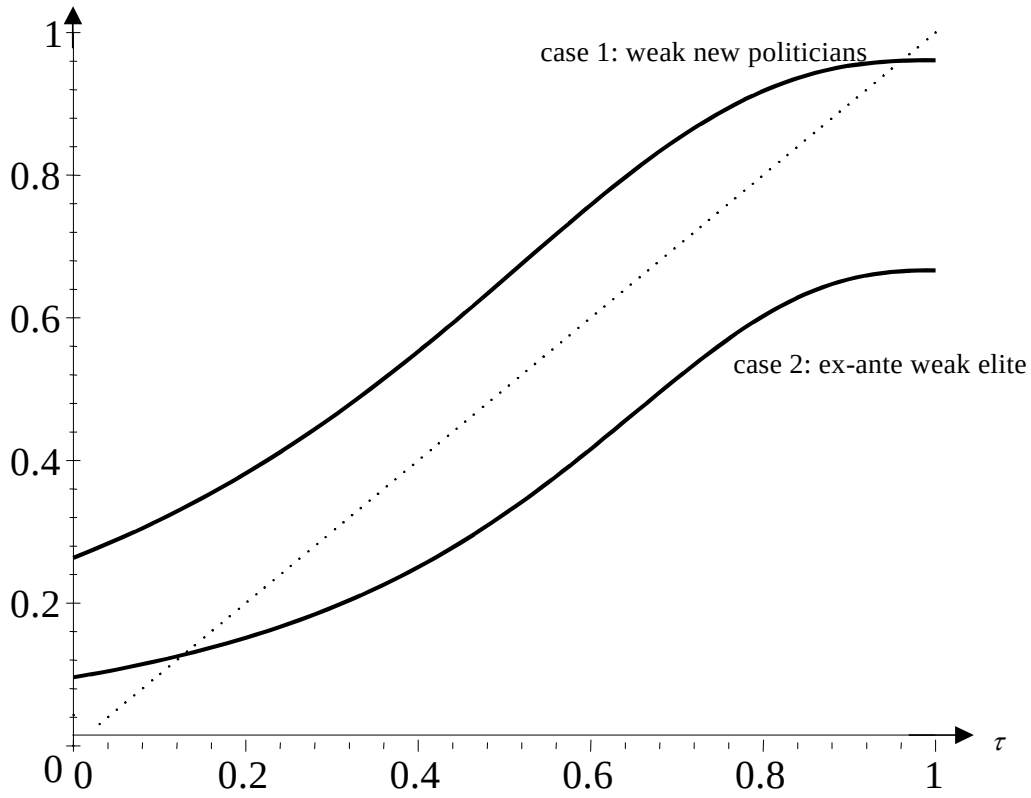

Figure 2: Alternative cases: A weak old elite and weak new politicians.[9]

Proof. Denote the two economies to be compared by indices A and B. We assume $\overline{y}_B > \overline{y}_A$. The political constraints are unaffected by the change in $\overline{y}$. The difference in equilibrium pay-off for the old elite between any tax level in economy A and the same tax level in economy B is then $\tau(\overline{y}_B - \overline{y}_A)$. This means that higher levels of τ have strictly higher relative pay-off in B compared to A. It can hence never be the case that the preferred outcome in A has a higher τ than in B because otherwise τ_B would have been a strictly inferior choice. ■

This 'resource fallacy' arises from the fact that a larger old economy on the one hand reduces the relative importance of the potential income from the new sector, and on the other hand increases the costs of a stronger modern sector because the stronger modern sector may reduce the old sector extraction rate.

With respect to the importance of the relative initial power of the old elite, we find a non-monotonicity:

Proposition 3 *Denote the initial situation as A and the new situation arising from a marginal increase in M_0 as B. $\frac{dRC(\tau)}{dM_0} = 0$ iff $\tau_A = \tau^{old}$. Otherwise, in the generic case $\frac{dRC(\tau)}{dM_0} > 0$ iff $\tau_A \in \{\tau_A^{\min}, \tau_A^{\max}\}$ and $\frac{dRC(\tau)}{dM_0} < 0$ iff $\tau_A = \tau'_A$. The sign of $\frac{dRC(\tau)}{dPP_0}$ is the opposite of the sign of $\frac{dRC(\tau)}{dM_0}$.*

Proof. The only cases where $\frac{dRC(\tau)}{dM_0} \neq 0$ is if $\tau_A \neq \tau^{old}$. It holds in any case that $\frac{d\tau^{\min}}{dM_0} < 0$ and $\frac{d\tau^{\max}}{dM_0} < 0$, whereas $\frac{d\tau'}{dM_0} > 0$. When $\tau_A \in \{\tau_A^{\min}, \tau_A^{\max}\}$, then in the generic case that point remains optimal (generically, the old elite strictly prefers one of the two which does not change with a marginal change in M_0) and hence $\frac{dRC(\tau)}{dM_0} > 0$. Generally hence, $\frac{dRC(\tau)}{dM_0} < 0$ iff $\tau_A = \tau'_A$. The statement on the relation between $\frac{dRC(\tau)}{dPP_0}$ and $\frac{dRC(\tau)}{dM_0}$ is immediate from the definition of $\bar{\tau}$. ■

The interesting case here is when an increase in the exogenous power of the modern sector actually increases τ. This case emerges when the ex ante

power of the modern sector was already high enough to force the old elite into the corner solution $\tau = \tau'$. This occurs only if $\tau^{old} < \tau'$. Intuitively, the stronger exogenous power of the modern sector forces the old elite to increase its extraction rate to prevent the modern sector from driving it down in the future to very low levels of profit (i.e. when $\tau = \tau^{\min}$).

There exists a second measure of strength of the old elite and the relative importance of the old sector. Namely the costs of building the new economy c (case 1 in figure 2). This measures the costs of RC. It will affect the profit curve (τ^{old} increases due to the lower productivity of the modern sector) and the constraints ($RC(\tau)$ is lower, hence less power is lost given a certain extraction rate).

Proposition 4 *An increase in c never increases the equilibrium size of the modern sector in all circumstances.*

Proof. An increase in c strictly decreases $RC(\tau)$, increases τ^{old} and shifts $\bar{\tau}$ upwards (hence increasing each element in the set $\{\tau_A^{\min}, \tau_A^{\max}, \tau^{old}\}$ but decreasing τ'). When $\tau_A \in \{\tau_A^{\min}, \tau_A^{\max}, \tau^{old}\}$, it is thus immediate that τ will increase and RC will thus decrease both directly and indirectly from the change in c. The only important case is thus $\tau_A = \tau'_A$. To see that RC must decrease, we need merely note that if it did not, then $\tau_B > \tau'_A$ which would make the point infeasible. ■

5 Production and Contacts

In this section we first provide some foundation for the assumption that contacts matter for output and then discuss the specific assumption we used above and how they affect the results.

5.1 A simple model of Contacts and Production

Suppose that there are X intermediate goods and X firms in the modern sector of the economy. Each firm i has a comparative advantage in the

production of the intermediate good i. We take this to mean that firm i has an endowment of X intermediate goods of type i and no other intermediate good. Let p_{ij} denote the use of the intermediate good j in the production of firm i. The output of the final good is assumed to be determined by a CES production function:

$$\begin{aligned} y_i &= \sum_j p_{ij}^{\gamma} \\ \text{with } 0 &< \gamma < 1 \end{aligned}$$

Having contacts in this example would literally mean being able to trade intermediate goods. If firm one has no contacts its output is given as

$$y_i(1) = X^{\gamma} \ .$$

If everyone is connected in this economy, then everyone would specialize completely in their field of comparative advantage and all firms would exactly use one unit of each intermediate good. Production in the representative firm is than equal to $y(X) = X$.

Consider now the case where $1 < x < X$ firms in this economy are connected and these x firms would agree to the social planner allocation of time and final output production. It is optimal that each firm uses the same amount of the x intermediate goods produced. The final output of the representative firm would thus be

$$y_i(x) = x \left(\frac{X}{x} \right)^{\gamma} = X^{\gamma} x^{1-\gamma} \ .$$

The resulting function $y_i(x)$ is thus a micro-founded production function of the value of having x contacts arising due to comparative advantages. This is the same as the production function assumed in section 3, if we add a constant.

5.2 Generalisation of the Production Function

In the following paragraphs we want to discuss what changes if we assume a more general production technology in our model as well as discuss the implications of discounting by both the modern and the old elite. Our analysis was based on a simple and explicitly specified single input production function and on the time structure of the model that avoided dynamic aspects (expectations) of modern sector firms.

The single input production function is in itself not a serious simplification. It represents a reduced form. A standard general equilibrium model incorporating labor spend either on physical production, an untaxed constant-returns-to-scale outside sector, or on generation of contacts, will lead to similar insights. It merely specifies the outside option of all agents explicitly in stead of implicitly (i.e. what firms would do if they do not invest RC).

What assumptions on $f(RC)$ are needed to derive our results? Whenever $f(RC)$ is continuous and exhibits decreasing returns to scale, we will see $\overline{\tau}(RC(\tau))$ increasing in τ. The maximum number of fixed points equals 1 plus twice the number of solutions to $\frac{d^2\overline{\tau}_t(RC(\tau))}{d^2\tau} = 0$, which hence depends on the inverse of the production function. As long as there are at least 3 fixed points, one again will have cases where a more powerful old elite allows a stronger growth of the modern sector than a weaker elite.

Regarding the dynamics, consider an extension where RC is a stock that depreciates. Let us assume this rate is given by δ. Thus RC_t follows:

$$RC_t = (1-\delta)RC_{t-1} + N_t.$$

If we now study the steady state of this problem we find that, in any steady state, it will have to hold that an extra unit of relational capital for the individual firm is worth precisely nothing:

$$\frac{1}{\rho+\delta}(1-\tau)f'(RC) = c$$

where the left-hand side is the discounted marginal value of an extra unit of RC and the right-hand side the cost involved. We get an implicit

decreasing function $\overline{RC}(\tau)$, which brings us in a qualitative sense back to the main model discussed above. The only substantial difference is that the beliefs of the firms in the modern sector are then important because they are in many situations self-fulfilling. This implies the possibility of a continuum of equilibria[10]. To avoid indeterminacy we would then need a restrictions on beliefs. One candidate that supports the main model is a focus on non-pessimistic equilibria: If there are two rational expectations equilibria, firms will coordinate on the one that gives them no lower expected pay-off than the current tax rates. A rationale for this is that firms after all are able to coordinate a belief that things will not get worse. If we make this assumption, then we essentially exclude any path from which one may get from one equilibrium to another one with a higher τ. This characteristic implies path dependence (if one starts from $\tau^{\min}$, only a massive shock can get you to τ' or higher. The reverse may happen by choice). The rest of the previous analysis however remains as before.[11]

Now, when the old elite has a higher than zero discount rate, it becomes possible that they sacrifice future profits for current profits and would thus arrive at a different steady state than in the zero-discount scenario. This is obviously only the case if τ^{old} is not a steady state in the zero-discount model, and indeed only when $\tau^{\min} < \tau^{old} < \tau'$ (it follows from the convexity of the per-period profit function of the old elite that only in this case is it possible to have a trade-off between future and current profits). The only difference

[10] To give an example: suppose one is, as before, in an equilibrium situation of three fixed points, where at t=0, $\tau = \tau^{\min}$ and $\tau^{old} > \tau'$. If all firms believe no other will invest, then they will expect $RC_{t+1} = \frac{RC_t}{1+\delta}$. If that value of RC_{t+1} coincides with $\overline{\tau} > \tau'$, firms will hence expect tax increases in the future which can rationalise the initial expectation. If on the other hand firms expect $RC_{t+1} = RC_t$, then this too must be a rational expectation.

[11] This perhaps curious result follows from the fact that nothing constrains extra investments in RC_t at any moment. Hence an old elite will immediately jump to τ^{old} if that is in the choice set because waiting caries no advantage. Otherwise an old elite in equilibrium will again be stuck at one of the points $\{\tau_A^{\min}, \tau_A^{\max}, \tau'\}$. This is because as long as modern sector firms minimally believe taxes will not increase, their behaviour will limit the old elite to the same choice set as in the case without dynamics.

then arises if in the zero-discount case $\tau^* = \tau'$. The relevant condition for $\tau^* = \tau'$ to remain as the steady state is if there is no path leading to $\tau^{\min}$ with higher discounted profits than the profits made keeping $\tau^* = \tau'$ for all periods. If there is such a path, then τ' can no longer be a steady state. This will be trivially the case with extreme discounting and more generally when discounting is high.

6 History Revisited and What is Happening in Uzbekistan?

The differing fortunes of the US and Brazil are particularly instructive for our model. The secession of the US from the UK was a tax revolt heavily dependent on networks of bankers and small industry. To a large extent this revolt was a surprise to the colonial powers, probably alerting elites for the first time to the power of modern networks. Brazil, as described by Gunter Frank (1967), contained the New World's first iron works, exported textiles and was then rich in coffee, gold, sugar, and diamonds. Its population was comparable to that of the US. In the 1780's, Brazil was experiencing a boom in small-scale industry very reminiscent of the US. With the example of the US in mind, the colonial ruler of Brazil (i.e. Portugal) decreed:

'I, the Queen,....., knowing of the large number of factories and manufactures which, in recent years, have spread through the various capitanias of Brazil, ..., I deem it well to order that all the factories, manufactures or shops of ships...shall be extinguished' (page 161)

This decree, enforced with the help of the natural resource sector, nipped the modern Brazilian sector in the bud. By the time the Portuguese royal court fled Napoleon's armies in 1808, Brazil no longer had a serious manufacturing base to help any war effort. Without this exogenous shock to the power of the modern sector at a crucial time, Brazil might well have been the world's foremost industrial power today.

In terms of the model and Figure 1, we interpret the successful tax revolt

against the UK in the US to be a case where τ had slipped below τ' without the colonial power (the UK) being aware of the actual balance of power. The political strength apparently inherent in the US at that time had simply gone unrecognized hitherto. We interpret Brazil in 1786 as a colony where the colonial power feared a similar event and hence set τ equal to $\tau^{\max}$.

The history of industrialization as well as the different developments of transition economies provide a wealth of further experiences. We first want to discuss shortly the European experience with industrialization. Similar to Acemoglu and Robinson (2000), we concentrate on the case of Britain and Germany vs. Austria and the Russian Empire.

As Acemoglu and Robinson (2000) argue, Britain and Germany initially had more democratic institutions compared to Austria and Russia. This implied that members of the modern sector had already in the beginning a larger say in the politics of those countries. This concurs with our model where a large power (M_0) of the modern sector at the beginning of the development period helps to develop a larger modern economy. To these observations, we add that Austria and Russia had relatively large old sectors; the civic society of both countries was less developed and more centralized than in Britain and Germany. Hence, the old elites had more to lose and the modern sector faced higher costs of building up a network. Furthermore, the political developments in other European countries might have warned the elites in Austria and Russia that a growing modern sector would demand political rights and hence decrease the rents to the old elite.

A modern source of relevant experiences is the comparison between transition economies that are resource poor compared with 'natural resource' economies.

Table one provides some (limited) evidence. It lists the countries in the former USSR, gives information about their growth experience in the 1995-2000 period, the composition of their economy, and the degree of press freedom in this period. We interpret the percentage of the economy working in the service sector as a proxy for the current size of the modern sector. The

countries of the former USSR are constitutionally all democracies but political freedom is often restricted by political control of the media. We interpret press freedom as an indicator of the political power of new politicians.

We can use this data to look at two hypothesis from the model. The first is the simple prediction that the bigger the size of the modern sector, the less political power the old elite has. This relation is depicted in Figure 3, where we have overlaid the prediction of a simple regression model. The highly significant negative slope (significant at the 1% level) reveals that the data cannot reject the hypothesis that a greater size of the service sector the lower the restraints on press freedom (and vice versa).

The second hypothesis we raise is that both very weak old elites and extremely strong old elites have less constraints on the growth of the modern sector. We empirically implement this by looking at whether we find a u-shaped relation between the political power of the old elite and the economic growth rate. This relation is depicted in Figure 4 which indeed finds a significant u-shaped relation between press freedom and economic growth. In the regression analysis underlying this, both the linear press freedom term and the quadratic press freedom term are significant at the 1% level. Furthermore, of those countries with high growth rates but low press freedom only one (Belarus) has an export economy mainly based on other things than natural resources industries.

Table 1 : Evidence from former USSR countries

Country	Agr./Ind./Serv. GDP comp % (Lab. force %)	Industries (% of export)	ΔGDP '95-00	Press Freed.
Armenina	30/26/44 (45/25/30)	diamonds, minerals, food	0,248	59 PF-
Azerbaijan	20/33/47 (41/7/52)	oil and gas (90)	0,615	76 NF
Belarus	15/40/45 (n.a.)	machinery, minerals	0,487	80 NF
Estonia	5.8/28.6/65.6 (11/20/69)	machin.(33),wood(15), textiles(14), food (8)	0,397	20 F-
Georgia	20/25/55 (40/20/40)	machinery, chemicals	0,091 ('96-00)	53 PF-
Kazakhstan	9/40/51 (20/30/50)	oil (58), metals (24)	0,352	70 NF
Kyrgyzstan	35/25/40 (55/15/30)	cott.,wool,gold, uranium	0,048	61 NF
Latvia	4.5/26/69.5 (15/25/60)	wood, machinery, metals	0,268	24 F-
Lithuania	8/31/61 (20/30/50)	miner.(23),text.(16), machin.(11),chem.(6)	0,272	20 F-
Moldova	28/23/49 (40/14/46)	food, textiles, machinery	-0,134	59 PF-
Russia	5.8/34.6/59.6 (12.3/22.7/65)	oil/gas,wood,metal, chemicals	0,291	60 PF-
Tajikistan	19/26/55 (67.2/7.5/25.3)	aluminium,electricity, cotton, food	0,306 ('96-00)	79 NF
Turkmenistan	27/50/23 (48/15/37)	gas/oil(83), cotton/textiles(5)	n.a.	89 NF
Ukraine	23/42/35 (24/32/44)	metals,fuel,chemicals, machinery	-0,005	60 PF-
Uzbekistan	36/21/43 (44/20/36)	cott.(41.5), gold(9.6), energy (9.6)	0,159 ('94-66)	84 NF
Sources	CIA Factb.(2003)	CIA Factbook (2003)	PTab[12]	PFS[13]

[12]GDP growth rates are taken from the Penn World Table: http://pwt.econ.upenn.edu/.

[13]Press Freedom Survey (Sussman and Deutsch Karlekar, 2002): 0-30 indicates a free, 31-60 a partially free and 61-100 a non-free press.

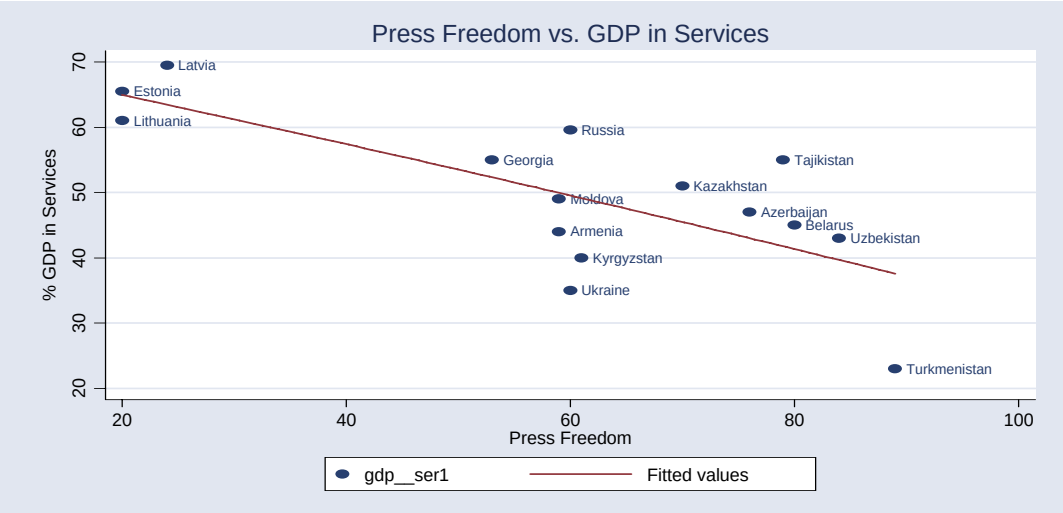

Figure 3: Press freedom and the size of the service sector in the former USSR countries

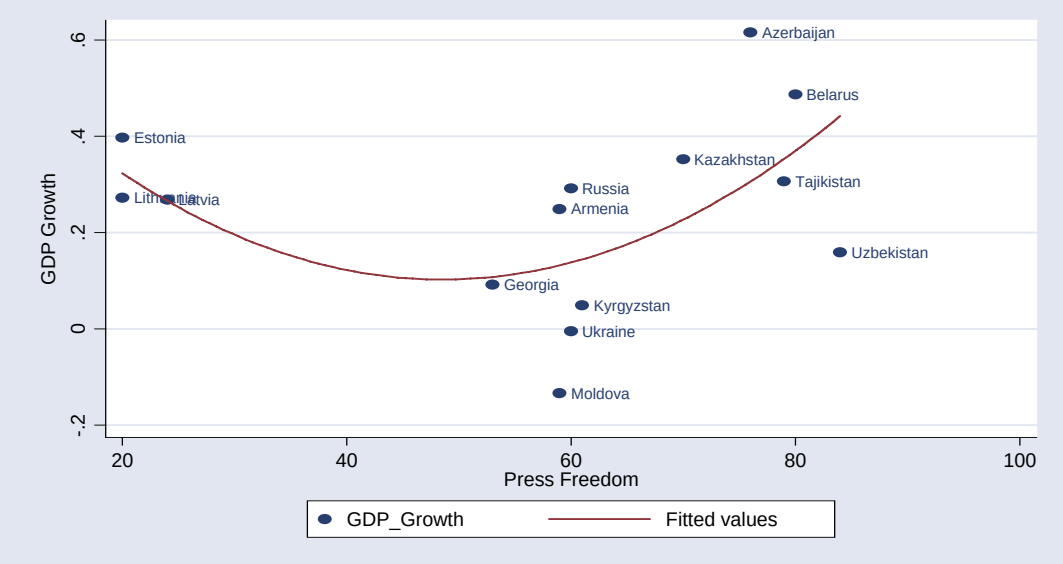

Figure 4: Press freedom and economic growth in the former USSR countries

With this data in mind, we can now pose the question why it is not the case that countries rich in natural resources use these resources to speed up the growth of a modern sector? Especially pertinent are the cases of the Arab Oil exporting countries like Oman, Saudi Arabia, and Kuwait. Our argument here is not only that there was little resource rent to fight over in the resource-poor transition countries compared to the middle east, but also that the old elite faced more initial political competition from an already partially developed new sector.

The richness of Asian CIS countries (incl. Uzbekistan) in natural resources could lead the old elite to actively discourage the growth of a modern sector. Furthermore, the lack of a civic society does not only erode the power of a modern sector at the beginning of the development, but it may also increase the costs of building networks (see Frijters, Bezemer, and Dulleck (2003) for an elaborate model of social capital, civic society and the costs of building networks). This leaves more power to the old elite and reduces the potential of the modern sector. This latter explanation may also explain why the countries joining the EU in 2004 are more advanced in their development than for example Bulgaria and Romania.

Preventing a modern sector from growing can take many guises. Limits on education are a case in point. Not only did the old elites of the former USSR countries distributed the pie among them given their former formal power, but the long period of Socialism laid the basis of real authority in the sense of Aghion and Tirole (1997), namely education and knowledge were eroded and had been only accessible to members of the system. Restricted use of public services is of course an implicit form of taxation on others. Such restrictions in much of the former USSR lead to the absence of oppositions like the opposition present in Poland and Czechoslovakia that was able to push the old elite aside.

7 Conclusions

We presented a model to show that a powerful old elite may implement policies that provide disincentives for modern sector to grow, if this modern sector affects the old elites ability to extract rents from the economy. The main argument is that a modern sector goes hand in hand with new networks that are not only production enhancing, but also affect politics.

We believe that this model adds to the understanding of historic developments. Firstly, we attempted to shift the focus from elite's supposed aversion to technology to an aversion against network formation. Secondly, we attempted to argue that instead of viewing changes in a system as discrete policy changes - either in the form of discrete reforms or in the form of revolutions, we should realize that elites always retain some power, which gives them an interest in larger future economies.

In our historical analysis, we interpreted the US as being 'lucky', i.e. as having been the first colony to experience the power of modern networks before its colonial ruler got wise to that power. We argue that Brazil, which in some sense had a large resource advantage compared to the US (and even some technological 'firsts') was unlucky. Its colonial ruler, the Queen of Portugal, in 1786 deliberately dismantled the growing manufacturing base of Brazil in favor of resource extraction and thereby prevented a US-type development path.

Besides its usefulness in the understanding of industrialization, the model also helps to understand the experiences of transition economies. All of the transition countries formally adopted a democracy, which meant the old elite had to defend its position by playing the democratic game. Nonetheless, those societies where the political base of a new sector was weak whilst natural resources were abundant saw reversed reforms after the break-up of the USSR. We also argue that regimes which are very highly entrenched in the sense of large 'fixed' political power have less to fear and may reform more than weaker regimes. This might explain why in growth regressions dictatorial regimes fare better in poor countries than democratic regimes.

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